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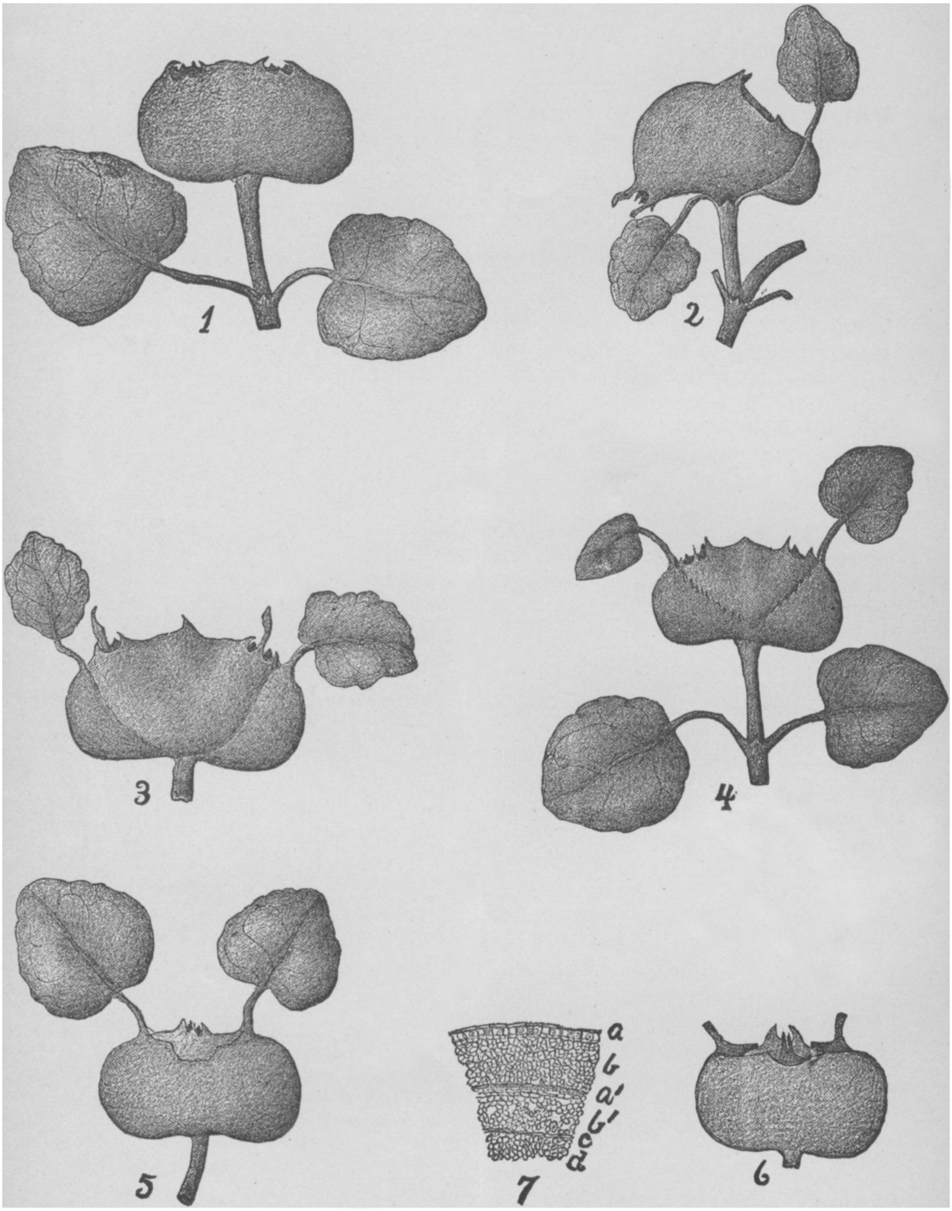
Plate XXVI.



W. R. Dudley, del.

BULLETIN
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TORREY BOTANICAL CLUB.

Vol. X.] New York, January, 1883. **[No. 1.**

Leafy Berries in Mitchella repens.

By William R. Dudley.

(Plate xxvi.)

Several suggestive variations, more or less teratological, have come under the writer's observations during a few years past, and one is here offered to the readers of the Bulletin which seems to follow a line of departure apparently of rare occurrence. It is the adnation, more or less complete, occurring between the berries and the true leaves of *Mitchella repens*, L.

By reference to the accompanying plate, it will be seen that a series is made out showing all conditions, from the partial adnation of one leaf-petiole (Fig. 2) to the complete envelopment of the berry by the expanded bases of both leaf-petioles (Fig. 5). There were twelve or fifteen excellent specimens in the writer's possession at the time the drawings were made (Nov., 1881), representing all grades of this union, between those shown in Figs. 2 and 5. There is, therefore, no mistake as to the true origin of these foliar organs.

The drawings need little explanation; but there are a few characters not readily made out from a black and white drawing. First, the blades of these adnate leaves were, in all cases, of the usual green color, or only a little paler. Second, in Fig. 2, the leaf on the left seems to arise from the side of the berry; but, from the *apparent* base of the petiole, the true base is plainly seen to expand, forming a broad convex covering, clasping and organically combined with the lower part of the berry itself.

The clasping base in this case, and in those in Figs. 3, 4 and 5, has always the ordinary scarlet color of the berry, and, in every way simulates its surface. Fven the base of the petiole of the leaf on the right in Fig. 2 was tinged with red on account of its proximity to the red fruit. Third, it is well known that the *Mitchella* flowers are usually twin, producing two corollas, etc., but only one berry, which is inferior. The two calyx-scars are seen in Fig. 2, but the berry is so distorted, apparently by the diversion of the sap-currents into the detached leaf, that the calyx on the right is much below its usual position. Again, in Fig. 5, we find only one calyx, possessing, however, two styles, as will be seen in the vertical section of the same (Fig. 6).

We have been led to present this freak of the partridge-berry somewhat in detail, not simply because we believed there was no published record of its occurrence in this species, but chiefly for the following reasons: In the various teratological works and papers within reach, no example of a precisely similar malformation is given of any plant. True, among the host of recent observers, it would be strange if similar cases had not been noticed, and probably records of such exist, but they cannot possibly be of common occurrence. Again, although the origin of these foliar members is evident, the meaning of the adnation is not clear; as the meaning of the reversion of the parts of a flower to leaves is clear, in the light of our accepted theory of metamorphosis.

In attempting to find the cause of the union between parts so rarely found organically united, a few facts and features were seen to stand out prominently, and led the writer to adopt the view (not a conclusive one, however,) presented later on. These facts serially stated are:

(1). The true peduncle has entirely disappeared, and those parts of the petioles coming in direct contact with the berry have become a part of it, and have readily assumed its color, texture and general aspect.

(2). This union has not interfered with the fruitfulness or development of the ovary, the seeds being present, and the size of the berry not being under the average.

(3). The flowers become consolidated, as in Fig. 5, and an increase or suppression of parts occurs in such cases without interfering with the development of the berry.

(4). In Figs. 3 and 4, where the twin corollas and calyces are distinct, there will be observed, half-way between them, a small fleshy point or protuberance, as if some extra-floral part, possibly a receptacle-like axis, had sought to show itself.

Taking these facts together, they seem to fit one hypothesis better than any other. In consideration of these points we may remark that it is stated, on good authority (see Prof. Morren's papers and Masters's Veg. Teratology), that floral monsters are usually sterile, not only on account of the suppression of stamens or carpels, but from the general disorganizing influence of such malformations. But, as we have already stated, fertility does not seem to be interfered with in our leafy partridge-berries, not even in the cases where there is a consolidation of both flowers. This condition of things has appeared to the writer to point to the conclusion that these changes are not far out of the line of the general tendency in the plant's life; and that the adnation seen may not be between as widely separated members as at first would appear. Furthermore, the first point mentioned, viz., the ready union of leaf-petioles with the berry proper, and their simulation of it, seems to indicate a closer relationship between its external portion and the leaves than we believe to exist between the leaves and the calyx. We have supposed, therefore, that a fleshy expansion of the receptacle, or an hypanthium, such as is supposed by many to exist in the lower part of the pear and some other inferior ovaries, might be present. With such a structure we could more readily imagine the union of the leaves to take place than with the calyx. At the same time, the essential organs would be less injuriously affected by this abnormal union. In brief, the changes would be between parts more or less extra-floral, and therefore not likely to seriously affect the fertility of the essential organs.

Finally, it would not be difficult to see how the twin flowers might be consolidated through the suppression of portions of this hypanthium; especially if we suppose the protuberance mentioned to be a continuation of it existing at the sides and between the two ovaries above, though not necessarily passing between and separating them internally. It is doubtful, however, whether this last point is worth much except as an attempt to explain the presence of these curious fleshy points.

In regard to Fig. 7, it was the result of a search for additional proof that the supposed petiolar expansions were really such, and superimposed over the parts commonly present. The cross-section was made above the middle of the berry, and revealed, in this one case, indistinct bands of narrow cells alternating with roundish ones, and corresponding in number to the wall of the carpel, the calyx and the epidermis of the fleshy petiolar portion. In other and similar sections no differentiations were found.

The section shown in Fig. 7, even allowing that the bands seen are to be interpreted as above, was made at such a height on the berry that it could be expected to throw little light, one way or the other, on the presence of a fleshy axis below, such as has been suggested in this paper. Subsequent sections made through the middle and lower portions of other berries revealed no differences in the hypodermal tissue that were at all clear.

All the specimens of the leafy berries from which the above studies were made were from this vicinity—the valley of Cayuga Lake. The larger number were collected in November, 1881. One (that from which Figs. 5 and 6 were taken) was found by Hon. H. B. Lord, along Cascadilla Creek, near Ithaca. The origin of the leafy appendages was not at all clear until a few days later, when by good fortune the writer found, about six miles from the first station, specimens representing all stages of the adnation. He noticed a single similar specimen on Cascadilla Creek in October, 1882.

The partridge-berry seems to be given to interesting variations. Its dimorphism has long been known. More recently, white berries have been detected at Canaan, Conn., and Moravia, N. Y.; and Dr. Atwood, the discoverer of the latter station, states that they appear on the same plants from year to year. Variations in the numerical plan of the flower, as well as the union of the two flowers, have been noticed frequently. Lastly, we note the adnation of the petioles of the upper pair of leaves with the fruit.

A word in regard to the common names. *Mitchella* seems to be pretty generally known as partridge-berry, especially by people who have studied botany. In certain portions of New England and Pennsylvania, however, it is called squaw-plum and squaw-berry, a name certainly indigenous, one might almost say aboriginal.

DESCRIPTION OF PLATE XXVI.—*Mitchella repens*, L., Fig. 1. Berry and upper pair of leaves, normal. Figs. 2, 3 and 4. Berries with leaf-petioles more or less adnate and fleshy. Fig. 5. Fleshy petioles completely enveloping the berry. Fig. 6. Vertical section of berry shown in Fig. 5. Fig. 7. Cell-structure of upper part of berry shown in Fig. 5. *a*, epidermis of expanded petiole ; *b*, fleshy portion of petiole ; *a'* and *b'*, fleshy calyx ; *c* and *d*, carpellary portion.